

JUL 18 2006

REMARKS

This is a full and timely response to the outstanding final Office Action mailed May 18, 2006. Claims 1-7, 9-11, 13-19, and 21-28 remain pending in the present application. Reconsideration and allowance of the application and pending claims are respectfully requested.

Response To Rejections of Claims Under 35 U.S.C. §102

Claims 21-22 and 24-26 have been rejected under 35 U.S.C. §102(b) as being anticipated by *Silverbrook* (U.S. Patent No. 6,019,457). Applicants respectfully traverse this rejection.

It is axiomatic that "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983). Therefore, every claimed feature of the claimed subject matter must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. §102(b). In the present case, not every feature of the claimed subject matter is represented in the *Silverbrook* reference. Applicants discuss the *Silverbrook* reference and Applicants' claims in the following.

a. Claim 21

As provided in independent claim 21, Applicants claim:

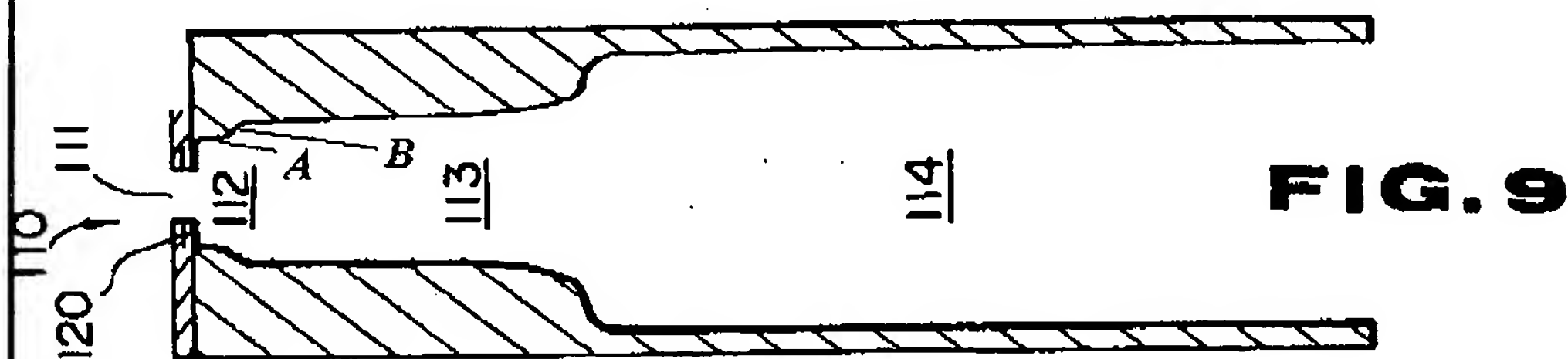
A print head forming method comprising:
forming a fluid-handling slot extending between a thin-film surface of a substrate and a generally opposing backside surface of the substrate; the slot extending along a long axis that lies generally parallel to the thin-film surface, wherein the slot has a cross-section taken transverse the long axis that is defined, at least in part, by one sidewall, wherein at least a first portion of the one sidewall is generally parallel to the thin-film surface of the substrate, and wherein a second portion of the one sidewall is generally perpendicular to the thin-film surface, and *wherein a third portion of the sidewall extends from the second portion to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot.*

(Emphasis added).

Applicants respectfully submit that independent claim 21 is allowable for at least the reason that *Silverbrook* does not disclose, teach, or suggest at least "wherein a third portion of the sidewall extends from the second portion to the thin-film surface of the substrate and

defines an obtuse angle with the second portion as measured through the slot," as recited and emphasized above.

Rather, *Silverbrook* appears to disclose at most a structure having a vertical sidewall portion extending from a non-perpendicular portion of the sidewall to the thin-film surface, as shown in FIG. 9. To further illustrate, FIG. 9 is reproduced below with the vertical portion marked as "A" and the non-perpendicular portion marked as "B."



As shown above, *Silverbrook* fails to teach or suggest "wherein a third portion of the sidewall extends from the second portion [which is generally perpendicular to the thin-film surface] to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot." For at least this reason, a *prima facie* case establishing an obviousness rejection by *Silverbrook* has not been made. Therefore, the rejection of claim 21 should be withdrawn.

In responding to previous arguments from the Applicants, the Office Action states that "Fig 9 shows curved surfaces, which includes obtuse angles. The claims do not cite that the obtuse angles is defined according to portions extending along a single crystalline plane, extending to and touching the top, thin-film surface." Final Office Action, page 7. Applicants respond by noting that claim 21 does recite "wherein a third portion of the sidewall extends from the second portion to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot" and none of the curved surfaces in Fig. 9 appear to satisfy the limitation. For at least this reason, claim 21 is not anticipated by *Silverbrook*.

b. Claims 22 and 24-26

Because independent claim 21 is allowable over the cited art of record, dependent claims 22 and 24-26 (which depend from independent claim 21) are allowable as a matter of

law for at least the reason that the dependent claims contain all the steps and features of independent claim 21. For at least this reason, the rejection of claims 22 and 24-26 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 22 and 24-26, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

Accordingly, the rejections to these claims should be withdrawn.

2. Response To Rejections of Claims Under 35 U.S.C. §103

In the Office Action, claims 1-7 and 9-11 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Hawkins '202* (U.S. Patent No. 5,006,202) in view of *Milligan* (U.S. Patent No. 6,273,557). Claims 13-19 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Hawkins '042* (U.S. Patent No. 6,303,042) in view of *Milligan*. Claim 23 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Silverbrook* in view of *Miller* (U.S. Patent Application Publication No. 2003/0141279 A1). Claims 27-28 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Silverbrook*. Claims 21-26 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Miller*. It is well-established at law that, for a proper rejection of a claim under 35 U.S.C. §103 as being obvious based upon a combination of references, the cited combination of references must disclose, teach, or suggest, either implicitly or explicitly, all elements/features/steps of the claim at issue. *See, e.g., In Re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981).

a. Claim 1

As provided in independent claim 1, Applicants claim:

A print head die forming method comprising:
forming a plurality of fluid-handling passageways and ejection chambers over a first surface of a substrate;
subsequent to said forming a plurality of fluid-handling passageways and ejection chambers, forming a first patterned masking layer sufficient to expose a desired area of a second generally opposing surface of the substrate;
after forming the first patterned masking layer, forming a second patterned masking layer sufficient to expose less than the entirety of the desired area of the second surface;

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forming a slot portion in the substrate through the second patterned masking layer; and

removing additional substrate material to form a fluid-handling slot sufficient to supply fluid from the second surface through the substrate to the first surface and the fluid handling passageways.

(Emphasis added).

Applicants respectfully submit that independent claim 1 is allowable for at least the reason that *Hawkins '202* in view of *Milligan* does not disclose, teach, or suggest at least "removing additional substrate material to form a fluid-handling slot sufficient to supply fluid from the second surface through the substrate to the first surface and the fluid handling passageways," as recited and emphasized above.

As shown in Figure 16 of *Hawkins '202*, a first surface of the substrate 12 in *Hawkins '202* appears to be the top surface of FIG. 6, since this is the surface having fluid handling passageways or similar structures. Accordingly, the bottom surface appears to be the second surface of the substrate. However, as shown in the figures, "a fluid-handling slot sufficient to supply fluid from the second surface through the substrate to the first surface and the fluid handling passageways" is not disclosed by *Hawkins '202*, where the fluid handling slot is formed by "removing additional substrate material. This is demonstrated in the figure below that is from *Hawkins '202* where "NO SLOT" is in reference to the lack of a fluid handling slot that is formed by removing additional material in addition to the slot portion previously formed.

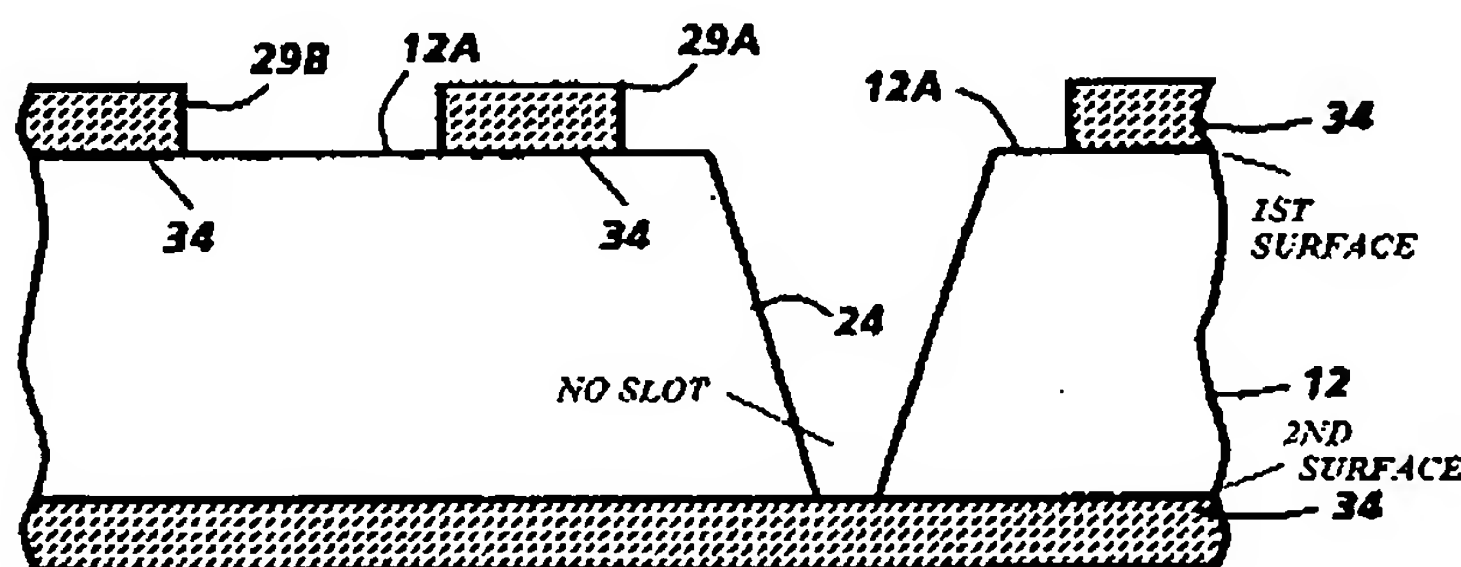


FIG. 8

Milligan does not remedy the deficiencies of the *Hawkins '202* reference. Therefore, *Hawkins '202* and *Milligan* each fail to teach or suggest at least "removing additional

substrate material to form a fluid-handling slot sufficient to supply fluid from the second surface through the substrate to the first surface and the fluid handling passageways," where a "slot portion" has already been formed. For at least this reason, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Hawkins* '202 in view of *Milligan* has not been made. Therefore, the rejection of claim 1 should be withdrawn.

In responding to previous arguments from the Applicants, the Office Action states that "Hawkins [sic] discloses to remove additional material by etching, and the feature of a slot being previously formed is obvious as shown by *Milligan*." Final Office Action, page 7. In response, Applicants fail to appreciate how *Milligan* cures the deficiencies of the *Hawkins* reference when *Milligan* seemingly teaches that a "slot portion" is formed after a "fluid handling slot" is formed. Accordingly, the cited art fails to anticipate claim 1.

b. Claims 2-7

Because independent claim 1 is allowable over the cited art of record, dependent claims 2-7 (which depend from independent claim 1) are allowable as a matter of law for at least the reason that the dependent claims 2-7 contain all the steps and features of independent claim 1. For at least this reason, the rejection of claims 2-7 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 2-7, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable. For example, the feature wherein the "act of forming a second patterned masking layer comprises forming a photo-resist layer," as recited in claim 3, is not taught or suggested by the proposed combination.

Accordingly, the rejections to these claims should be withdrawn.

c. Claim 9

As provided in independent claim 9, Applicants claim:

A fluid-feed slot forming method comprising:
forming a plurality of fluid-handling passageways and ejection chambers over a first substrate surface;
subsequent to said forming a plurality of fluid-handling passageways and ejection chambers over a first substrate surface, patterning a hard mask on a generally opposing second substrate sufficient to expose a first area of the

second surface;

forming a slot portion in the substrate through less than an entirety of the first area of the second surface, the slot portion having a cross-sectional area at the second surface that is less than a cross-sectional area of the first area; and

after forming the slot portion, etching the substrate to remove material from within the first area to form a fluid-handling slot between the first and second surfaces sufficient to supply fluid to the fluid handling passageways.

(Emphasis added).

Applicants respectfully submit that independent claim 9 is allowable for at least the reason that *Hawkins '202* in view of *Milligan* does not disclose, teach, or suggest at least "after forming the slot portion, etching the substrate to remove material from within the first area to form a fluid-handling slot between the first and second surfaces sufficient to supply fluid to the fluid handling passageways," as recited and emphasized above.

Rather, *Hawkins '202* appears to disclose at most a structure having a first masking layer 34 exposing an area of a surface of a substrate 12, as shown in FIG. 3. Later, in FIG. 4 a second masking layer 14 is added. However, the second masking layer does not expose less than the entirety of the area of the surface of substrate 12 mentioned previously. Moreover, FIG. 5 also shows a photo resist layer 30 being added that does not expose less than the entirety of the area of the surface mentioned previously.

As shown in Figure 16 of *Hawkins '202*, a first surface of the substrate 12 in *Hawkins '202* appears to be the top surface of FIG. 6, since this is the surface having fluid handling passageways or similar structures. Accordingly, the bottom surface appears to be the second surface of the substrate. However, as shown in the figures, "a fluid-handling slot sufficient to supply fluid from the second surface through the substrate to the first surface and the fluid handling passageways" is not disclosed by *Hawkins '202*, where the fluid handling slot is formed by "removing additional substrate material. This is demonstrated in the figure below that is from *Hawkins '202* where "NO SLOT" is in reference to the lack of a fluid handling slot that is formed by removing additional material in addition to the slot portion previously formed.

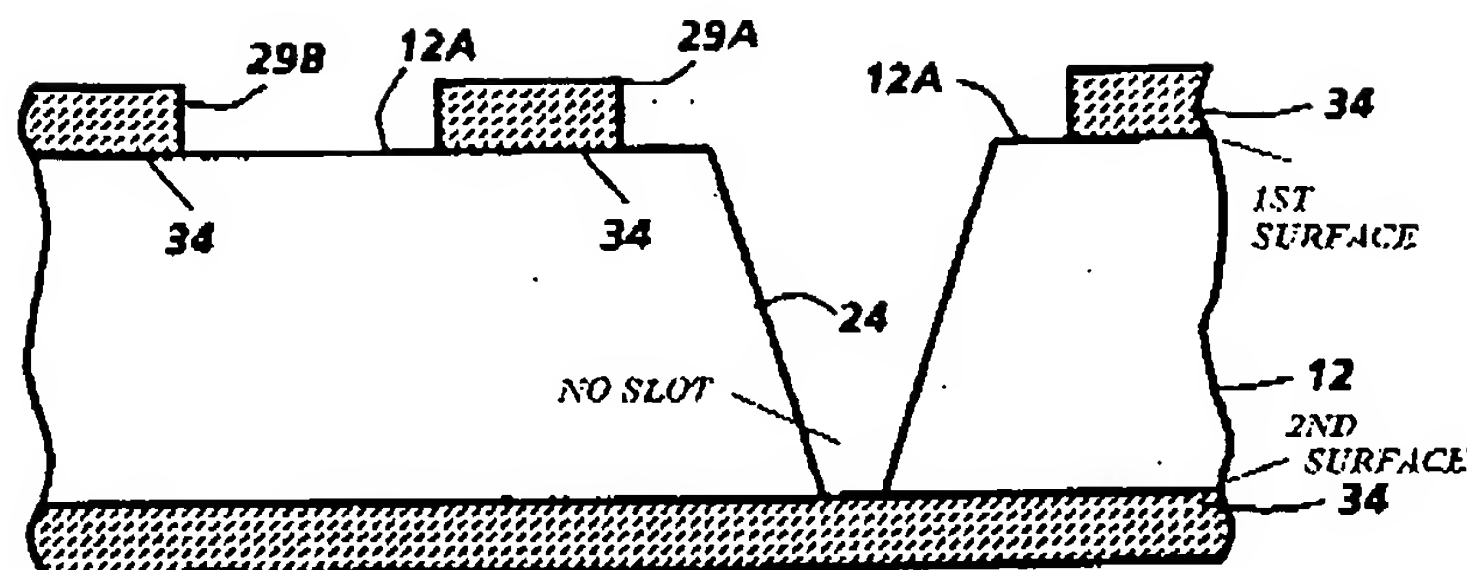


FIG. 8

Milligan does not remedy the deficiencies of the *Hawkins '202* reference. Therefore, *Hawkins '202* and *Milligan* each fail to teach or suggest at least "forming a slot portion in the substrate through less than an entirety of the first area of the first surface, the slot portion having a cross-sectional area at the first surface that is less than a cross-sectional area of the first area." For at least this reason, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Hawkins '202* in view of *Milligan* has not been made. Therefore, the rejection of claim 9 should be withdrawn.

In responding to previous arguments from the Applicants, the Office Action states that "Hawkins discloses a channel plate, through which fluid flows. Fig.24 shows how fluid can flow through both surfaces, from top to bottom, or from bottom to top." Final Office Action, page 8. Applicants respond by noting that in the process of forming the channel plate in *Hawkins '202*, the process described in the claims is not followed, as shown in Figs. 22 and 23 of *Hawkins '202*. For example, "patterning a hard mask on a generally opposing second substrate sufficient to expose a first area of the second surface; [and] forming a slot portion in the substrate through less than an entirety of the first area of the second surface, the slot portion having a cross-sectional area at the second surface that is less than a cross-sectional area of the first area" is not disclosed by the *Hawkins* reference.

The Office Action also states that "it is impossible to etch through more than the entirety. Only what is exposed is etched, and since less than an entirety is exposed, less than an entirety is etched." Final Office Action, page 8. Applicants submit that a hard mask may be used on a substrate surface to expose a first area, where not all of this first area has to be used in forming a slot portion. However, *Milligan* and *Hawkins '202* teach that the entirety of such a first area is used to form a slot portion. For at least this reason, a *prima facie* case of obviousness has not been established.

d. Claims 10-11

Because independent claim 9 is allowable over the cited art of record, dependent claims 10-11 (which depend from independent claim 9) are allowable as a matter of law for at least the reason that the dependent claims 10-11 contain all the steps and features of independent claim 9. For at least this reason, the rejection of claims 10-11 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 10-11, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

Accordingly, the rejections to these claims should be withdrawn.

e. Claim 13

As provided in independent claim 13, Applicants claim:

A print head substrate forming method comprising:
forming a plurality of fluid-handling passageways and ejection chambers over a first substrate surface;
subsequent to said forming a plurality of fluid-handling passageways and ejection chambers, exposing a first portion of a second generally opposing substrate surface through a hard mask;
forming a photoresist over the hard mask and the first portion;
removing at least some of the photoresist to expose a second portion of the substrate surface through which a slot portion is to be formed;
dry etching the substrate through the photoresist sufficient to form the slot portion, and,
after said dry etching, wet etching the substrate to form a fluid-handling slot through the substrate to supply fluid received at the second surface through the substrate and to the fluid-handling passageways and ejection chambers via the slot portion.

(Emphasis added).

Applicants respectfully submit that independent claim 13 is allowable for at least the reason that *Hawkins '042* in view of *Milligan* does not disclose, teach, or suggest at least "after said dry etching, wet etching the substrate to form a fluid-handling slot through the substrate to supply fluid received at the second surface through the substrate and to the fluid-handling passageways and ejection chambers via the slot portion," as recited and emphasized above.

Rather, *Hawkins '042* appears to disclose at most a structure having an etched region 534. *Hawkins '042* fails to disclose a fluid-handling slot. Accordingly, in the structure of FIG. 5b, fluid is not received through the substrate to fluid-handling passageways and ejection chambers via the etched region 534.

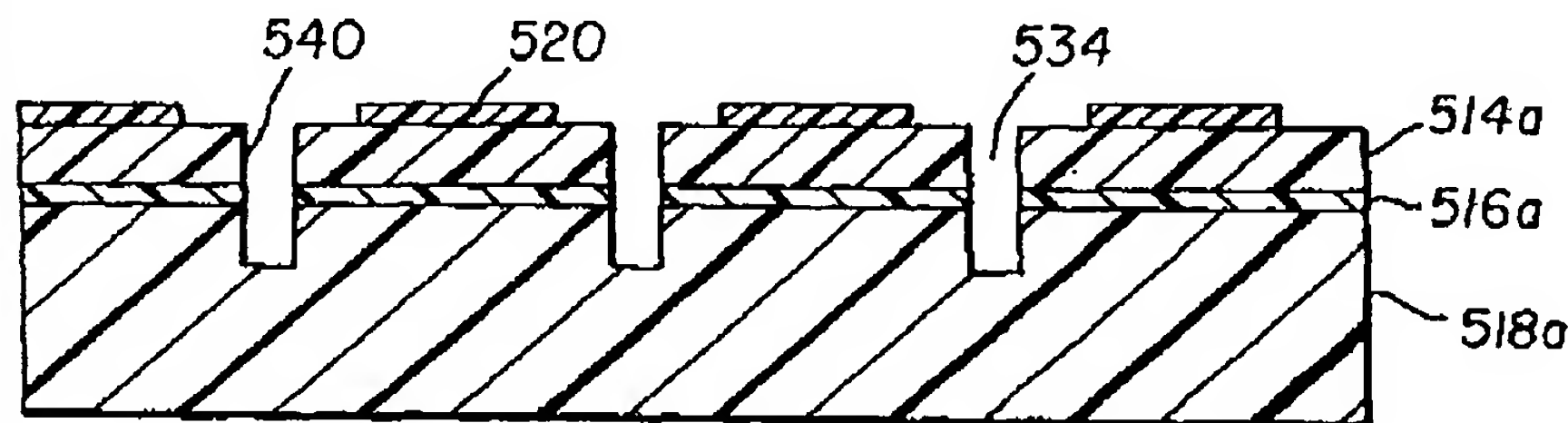


FIG. 5b

Therefore, *Hawkins '042* in view of *Milligan* does not disclose, teach, or suggest all of the features of claim 13, since *Milligan* does not remedy the deficiencies of the *Hawkins '042* reference. For at least this reason, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Hawkins '042* in view of *Milligan* has not been made. Therefore, the rejection of claim 13 should be withdrawn.

f. Claims 14-19

Because independent claim 13 is allowable over the cited art of record, dependent claims 14-19 (which depend from independent claim 13) are allowable as a matter of law for at least the reason that the dependent claims 14-19 contain all the elements and features of independent claim 13. For at least this reason, the rejection of claims 14-19 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 14-19, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

Accordingly, the rejections to these claims should be withdrawn.

g. Claims 23 and 27-28

Because independent claim 21 is allowable over the cited art of record, dependent claims 23 and 27-28 (which depend from independent claim 21) are allowable as a matter of law for at least the reason that the dependent claims contain all the steps and features of independent claim 21. For at least this reason, the rejection of claims 23 and 27-28 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 23 and 27-28, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable. Further, Applicants incorporate the remarks made in the prior response with regard to the finding of Official Notice.

Accordingly, the rejections to these claims should be withdrawn.

h. Claims 21-26

Applicants respectfully submit that independent claim 21 is allowable for at least the reason that *Miller* does not disclose, teach, or suggest at least "wherein a third portion of the sidewall extends from the second portion to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot," as recited and emphasized above.

Rather, *Miller* appears to disclose at most a structure having a vertical sidewall extending from one portion of the sidewall to the thin-film surface 610, as shown in Fig. 9b. Therefore, *Miller* fails to teach or suggest "wherein a third portion of the sidewall extends from the second portion [which is generally perpendicular to the thin-film surface] to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot."

Although the Office Action references Figures 9g and 9h, these figures fail to show a portion of a sidewall extending from a perpendicular-portion of the same sidewall to a thin-film surface of a substrate, where an obtuse angle is defined between the two portions. To illustrate, Figures 9g and 9h are shown below. In contrast to Office Action statements and as shown in the figures below, it appears clear that the curved portion at the bottom of these figures does not extend from a perpendicular portion of the sidewall at the top of the figures.

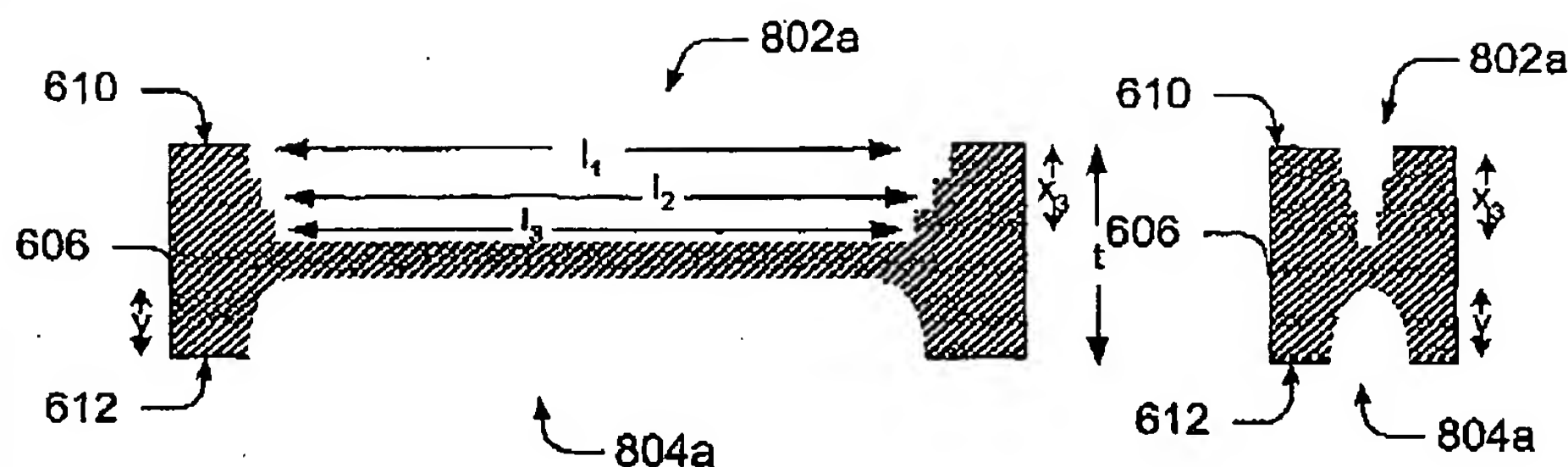


Fig. 9g

Fig. 9h


For at least this reason, a *prima facie* case establishing an obviousness rejection by *Miller* has not been made. Therefore, the rejection of claim 21 and claims 22-26 (which depend from claim 21) should be withdrawn.

In responding to previous arguments from the Applicants, the Office Action states that Applicants previous arguments, which are contained herein, are "not commensurate in scope with the claims. The claims have open comprising language, and "extending" is a broad term." Final Office Action, page 8. In response, Applicants reference the language of claim 21 which states "wherein a third portion of the sidewall extends from the second portion to the thin-film surface of the substrate and defines an obtuse angle with the second portion as measured through the slot" and respectfully submits that the limitations specified in the claims are not satisfied by the teachings of the cited art. (Emphasis added). Accordingly, the cited art fails to teach or suggest all of the claimed features of claim 21.

CONCLUSION

For at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

Respectfully submitted,


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